

A NEW GENUS OF LATE TERTIARY PENGUIN FROM LANGEBAANWEG, SOUTH AFRICA

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(With 5 figures and 3 tables)

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ABSTRACT

Additional specimens of penguin bones from the 'E' Quarry in the latest Miocene/early Pliocene Varswater Formation make possible the identification of the larger of the two penguin taxa in that fauna and its definition as a new genus and species, *Dege hendeyi*.

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INTRODUCTION

In two previous papers (Simpson 1971, 1975) an extinct genus and species of penguins, *Inguza predemersus*, was described and named from the late Tertiary of Langebaanweg. It was noted that a second, clearly distinct taxon occurred in the same deposit, but the specimens then at hand did not suffice for adequate identification or, if new, definition of that taxon. Specimens subsequently collected, although still not ideal, do suffice for those purposes and are here described and named as a new genus and species.

The specimens are all from the 'E' Quarry in the Varswater Formation in the vicinity of Langebaanweg, Cape Province. The Varswater Formation is of very late Miocene and/or early Pliocene age (Hendey 1978). The quarry and its stratigraphy have been carefully described by Hendey (1976), and those data need not be repeated here. Hendey has shown that the rich faunas of this formation represent a number of different environments—marine, estuarine, fluvial, and terrestrial. Almost all known fossil penguins have been found in marine beds but generally in those deposited near shore or in distinctly littoral conditions. The Varswater penguins also have some marine associates, but the overall fauna of this varied formation, especially as regards the mammals except for cetaceans, a seal and an otter, is predominantly nonaquatic.

Most of the specimens here studied come from the middle member of the Varswater Formation, formerly (Hendey 1974) designated as 'Bed 2' but now (Hendey 1976) as the Quartzose Sand Member. Some, however, may be either

from that member or from one of two fossiliferous beds, 3aS and 3aN of Henley, in the overlying Pelletal Phosphorite Member (formerly 'Bed 3'). The field data provided by Henley are given below for each specimen listed in the hypodigm of the new species.

All specimens are in the South African Museum. All bear catalogue numbers with the prefix (SAM-PQ). As that prefix is uniform throughout, only the distinctive locality prefix (L) and numerical part of the catalogue designation will be given hereafter.

All measurements are in millimetres. In Tables 2 and 3 the following abbreviations are used:

- N number of specimens in sample.
- OR observed range.
- $\bar{X} \pm$ sample mean and its standard error.
- $S \pm$ sample estimate of standard deviation and its standard error.
- $V \pm$ sample estimate of coefficient of variation and its standard error.

Most of the designations and definitions of the dimensions involved in the tables are among those used in Simpson (1975) as follows:

Humerus:

- a. Maximum longitudinal dimension.
- b. Width of shaft about one-third of the distance distal to head.
- c. Width of shaft about two-thirds of distance distal to head.
- d. Distance from radial condyle to longest distal process.

Femur:

- a. Distance from the hollow between head and trochanter to that between distal condyles.
- b. Proximal width.
- c. Distal width.

Tibiotarsus:

- a. Distance from the proximal articulation, excluding the crest, to the hollow between distal condyles.
- b. Distal width.

The fragmentary nature of the three partial tarsometatarsi prevents use of standard dimensions (*a-c* in Simpson 1975) for this bone but the following *ad hoc* dimension is used:

Tarsometatarsus:

- d. Width across distal ends (phalangeal articulations) of metacarpals II-III.

SYSTEMATICS

Order SPHENISCIFORMES

Family Spheniscidae

Dege gen. nov.*Etymology*

Dege, pronounced approximately *day-gay*, is an augmentative form of Swahili *ndege*, 'bird', hence 'big bird'. It is hoped that, as with *Inguza*, this will be an interesting change from the now rather stereotyped names of fossil penguins based on classical roots. There are, of course, larger African birds, but 'big bird' is appropriate because the type-species of *Dege* is larger than that of *Inguza* and also larger than the living African penguin, *Spheniscus demersus*. There seems to be no simple Swahili word for 'penguin' and in that language a penguin is designated descriptively, for example, as *ndege ya nchi za baridi*, approximately 'cold country bird'.

Dege is arbitrarily considered masculine in taxonomic usage.

Type-species

Dege hendeyi sp. nov.

Included species

Type only.

Known distribution

Langebaanian latest Miocene/early Pliocene in the Quartzose Sand Member and perhaps the Pelletal Phosphorite Member of the Varswater Formation near Langebaanweg.

Diagnosis

Tarsometatarsus short and stout. Medial intermetatarsal foramen present, relatively proximal and small, plantar opening more radial than in *Inguza* or *Aptenodytes* and *Pygoscelis* but less medial than in *Spheniscus* or most other Recent penguins. Medial calcaneal ridge not entire on known specimens but apparently weakly developed. Humerus with strongly bipartite tricipital fossa, dorsal part deeper but smaller, ridge between the two parts of the fossa parallel to long axis of bone. Latissimus dorsi insertion small, circular, convex. Shaft slightly bowed, not distinctly sigmoid, slightly wider distally than proximally. Preaxial angle feeble or absent. Femur and tibiotarsus sphenisciform, without marked peculiarities. (Figs 1-5.)

Discussion

Apart from size and proportions, the tarsometatarsus is especially distinctive in the position and course of the medial intermetatarsal foramen (the inner proximal foramen of Zusi 1975). The plantar opening is somewhat broken on



Fig. 1. Dorsal and plantar views of *Dege hendeyi* holotype (partial left tarsometatarsus, L28455) from Langebaanweg. (Twice natural size.)

specimen L28455, holotype of the type-species, but seems clearly to have been in a position unlike that in any other penguin known to me. Zusi (1975) and others have noted that this opening is on the medial side of a prominent calcaneal ridge in most Recent genera, but less medial and below a less prominent ridge in *Aptenodytes* and *Pygoscelis*. In *Dege* it is apparently in a position more or less intermediate between those two states. It is not known which, if either,



Fig. 2. Dorsal, ventral and posterior views of *Dege hendeyi* left humerus (L55005) from Langebaanweg. (Natural size.)



Fig. 3. Distal view of *Dege hendeyi* left humerus (L55010) from Langebaanweg. (Twice natural size.)

state is more primitive. The humerus is less distinctive and is within the rather stereotyped penguin pattern, but in detail is not quite like that of any other genus in which this part is known.

The only known penguins other than *Inguza* and *Dege* that may be of comparable age are three specimens from Motunau Beach on the South Island of New Zealand (Marples 1960; Simpson 1972). This Pliocene locality is about 10° farther south and almost 156° farther east than Langebaanweg, but that alone does not necessarily preclude generic relationships. Some living genera



Fig. 4. Anterior and posterior views of *Dege hendeyi* left femur (L28217) from Langebaanweg. (Natural size.)

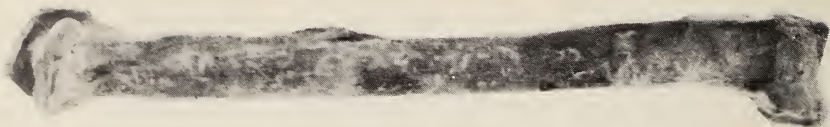


Fig. 5. Anterior view of *Dege hendeyi* right tibiotarsus (L5503) from Langebaanweg. (Natural size.)

have comparably wide ranges. However, the known Langebaanweg and Motunau fossil penguins are quite different. Known parts of two of the Motunau penguins are not generically distinguishable from the living genera *Pygoscelis* and *Aptenodytes* and are referred to those genera as extinct species. The humerus of *P. tyreei* can be compared with *Inguza* and *Dege* and the tarsometatarsus of *A. ridgeni* can be similarly compared as can other parts of living *Pygoscelis* and *Aptenodytes*. The diagnoses of *Inguza* and *Dege* include distinctions from *Pygoscelis* and *Aptenodytes* that are reasonably construed as of generic rank. The third Motunau genus, *Marplesornis*, can be compared mainly on the basis of a not quite perfect humerus, which differs from both *Inguza* and *Dege* in having an extraordinarily expanded and somewhat concave latissimus dorsi insertion and from *Dege* in having the shaft distinctly more expanded distally.

Dege hendeyi sp. nov.

Etymology

For Dr Q. B. Hendey, who supervised collecting of these and many other fossils at Langebaanweg and who has done so much research on the geology and fauna of that deposit.

Holotype

L28455, left tarsometatarsus with most of metatarsals II and III, lacking metatarsal IV* and proximal articulation. From Quartzose Sand Member.

Hypodigm

Holotype and the following. From Quartzose Sand Member: L22985, fragment of left tarsometatarsus with most of distal end of metatarsal III; L28456, fragment of right tarsometatarsus with distal ends of metatarsals III and IV; L13154, right femur nearly complete; L25028, left femur nearly complete; L25807, right femur nearly complete; L28216, right femur nearly complete; L28217, left femur complete; L28222, left tibiotarsus complete. From Quartzose Sand Member or bed 3aN of Pelletal Phosphorite Member: L55004, left humerus with proximal and distal ends imperfect; L55005, left humerus with distal end imperfect; L55003, right tibiotarsus complete. From Quartzose

* The missing metatarsal IV was found and restored to the holotype after this study was completed.

Sand Member or bed 3aS of Pelletal Phosphorite Member: slightly damaged proximal end of right humerus; L55010, well-preserved distal end of left humerus; L3656, left femur with proximal and distal ends slightly abraded.

Known distribution

As for the genus.

Diagnosis

Only known species of the genus. Measurements as in Tables 1 and 2.

TABLE 1

Measurements of specimens of *Dege hendeyi*.

(Specifications of measurements are given in the text.)

Tarsometatarsus				<i>d</i>
Holotype 23018				12,7
Humerus	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
L55004	c. 69	12,8	14,0	—
L55005	c. 68,5	13,4	14,4	—
L55010	—	—	—	20,3
Tibiotarsus	<i>a</i>	<i>b</i>		
L55003	106,5	16,0		
L28222	108,2	15,3		

TABLE 2

Statistics on femora of *Dege hendeyi*.

(Specifications of variates and symbols of statistics are given in the text.)

Variate	N	OR	\bar{X}	S	V
<i>a</i>	6	70,4–79,5	75,13±1,30	3,17±0,92	4,22±1,22
<i>b</i>	5	17,3–18,6	18,16±0,25	0,56±0,18	3,88±0,97
<i>c</i>	5	15,1–17,9	16,96±0,50	1,11±0,35	6,57±2,08

Discussion

Inguza and *Dege* are distinct genera, not necessarily more closely related to each other than to some other penguins, but they occur together and sorting or preliminary identification can most easily be made by the difference in size of their type-species. Comparable measurements of those species are given in Table 3.

As noted above, some of the specimens of *Dege hendeyi* may have come from the Pelletal Phosphorite Member, which overlies the Quartzose Sand Member and must be to some degree younger in age. Hendey (1976) has suggested that the differences may be appreciable and that further studies of the enlarged collection from the Pelletal Phosphorite Member may reveal some faunal difference, although this has not yet been clearly established. In the material here studied, it happens that specimen L3656, the only femur that may be from the Pelletal Phosphorite Member, is the largest of the six femora referred to *Dege hendeyi*. The difference is not great enough to warrant any taxonomic distinction, and as the matter now stands the whole lot could well, and probably does, represent a single, not even particularly variable species.

TABLE 3

Comparative dimensions of *Dege hendeyi* and *Inguza predemersus*.
(Specifications of variates and symbols of statistics are given in the text.)

Variate	Species	N	OR	\bar{X}
Tarsometatarsus <i>d</i>	<i>Dege hendeyi</i>	1	—	16,5
	<i>Inguza predemersus</i>	1	—	12,7
Humerus <i>a</i>	<i>D. hendeyi</i>	2	68,5–69,0	68,75
	<i>I. predemersus</i>	2	57,5–59,0	58,25
<i>b</i>	<i>D. hendeyi</i>	2	12,8–13,4	13,10
	<i>I. predemersus</i>	6	8,6–10,0	9,35
<i>c</i>	<i>D. hendeyi</i>	2	14,0–14,4	14,20
	<i>I. predemersus</i>	5	10,0–11,7	10,98
<i>d</i>	<i>D. hendeyi</i>	1	—	20,30
	<i>I. predemersus</i>	4	17,8–19,3	18,60
Femur <i>a</i>	<i>D. hendeyi</i>	6	70,4–79,5	75,13
	<i>I. predemersus</i>	3	59,8–62,3	61,20
<i>b</i>	<i>D. hendeyi</i>	5	17,3–18,6	18,16
	<i>I. predemersus</i>	2	13,9–14,4	14,15
<i>c</i>	<i>D. hendeyi</i>	5	15,1–17,9	16,96
	<i>I. predemersus</i>	4	13,3–14,5	13,78

All the penguin bones from this deposit are dissociated, but they fall into two non-overlapping size groups and the ratios of measurements of non-homologous bones are similar to those of associated bones in Recent species and in the few fossil species in which associated bones have been found. It is highly probable that the known Langebaanweg specimens do represent just two species and are correctly sorted by size.

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REFERENCES

- HENDEY, Q. B. 1974. The late Cenozoic Carnivora of the south-western Cape Province. *Ann. S. Afr. Mus.* **63**: 1–369.
- HENDEY, Q. B. 1976. The Pliocene fossil occurrences in 'E' Quarry, Langebaanweg, South Africa. *Ann. S. Afr. Mus.* **69**: 215–247.
- HENDEY, Q. B. 1978. The late Tertiary Hyaenidae from Langebaanweg, South Africa, and their relevance to the phylogeny of the family. *Ann. S. Afr. Mus.* **76**: 265–297.
- MARPLES, B. J. 1960. A fossil penguin from the later Tertiary of North Canterbury. *Rec. Canterbury Mus.* **7**: 185–195.
- SIMPSON, G. G. 1971. Fossil penguin from the late Cenozoic of South Africa. *Science* **171**: 1144–1145.

- SIMPSON, G. G. 1972. Pliocene penguins from North Canterbury, New Zealand. *Rec. Canterbury Mus.* 9: 159-182.
- SIMPSON, G. G. 1975. Notes on variation in penguins and on fossil penguins from the Pliocene of Langebaanweg, Cape Province, South Africa. *Ann. S. Afr. Mus.* 69: 59-72.
- ZUSI, R. L. 1975. An interpretation of skull structure in penguins.* *In: STONEHOUSE, B., ed. The Biology of Penguins: 59-86.* London and Basingstoke: Macmillan.

* This study also refers to postcranial bones and classification of Recent penguins.